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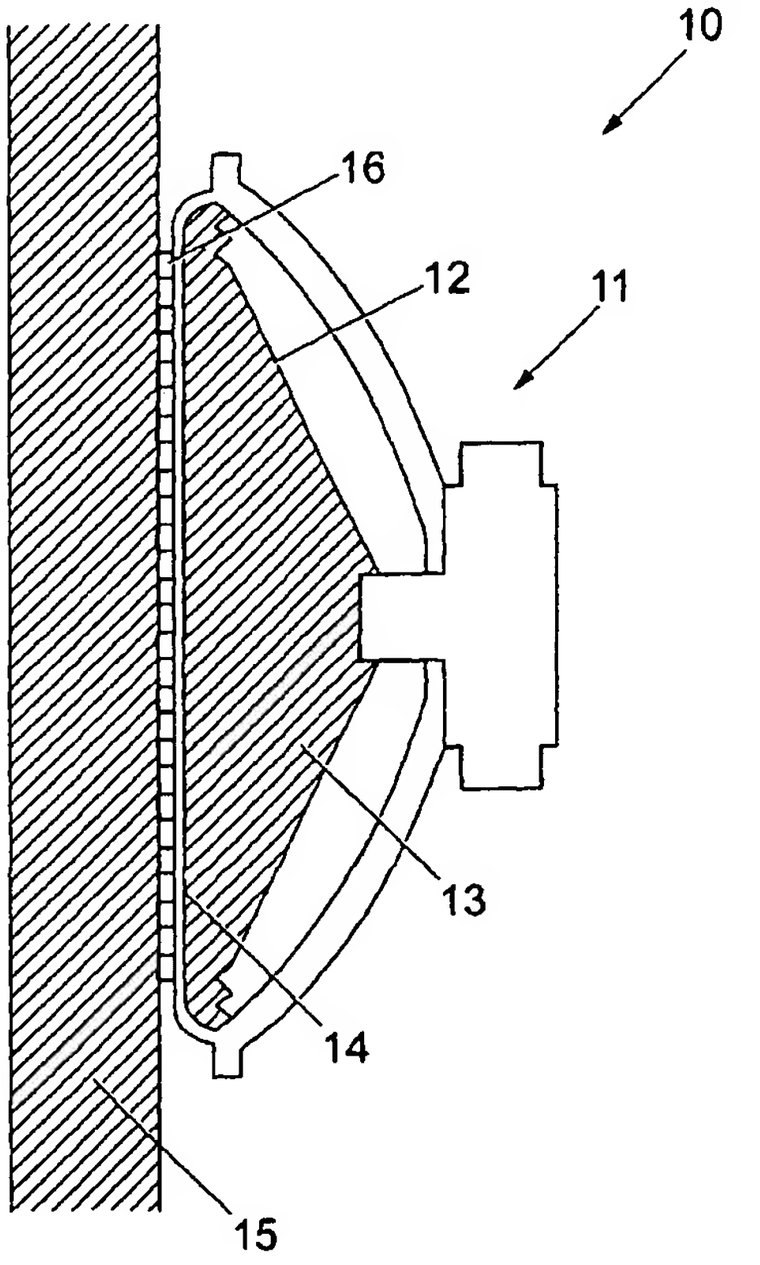
*[Continued on next page]*

(54) Title: SPEAKER ARRANGEMENT




(57) Abstract: There is described a speaker arrangement (10) which comprises a sound emitting element which is formed of a standard loudspeaker (11) having a cone (12). The cone (12) is filled with a filling material (13) which is inserted into the interior of the cone (12). The loudspeaker (11) can be attached to the rear of a display panel (15) if desired. The loudspeaker (11) is driven by an amplifier which is integrated into circuitry, the circuitry also including an audio input (such as an MP3 player), volume control and a power source. The circuitry can also incorporate further input signals such as signals from activation sensors and signals from a communication device used to update the audio data utilised by the MP3 player. There is also described a method of providing display panels, the display panels incorporating an audio player and speaker, the method comprising the steps of supplying and distributing display panels incorporating a speaker, designing and producing panel graphics to be displayed on the display panels, producing and directing audio messages, producing and distributing of the audio messages to a consumer, and updating and replacing the art work on the graphic panels when necessary.

WO 02/074006 A2

European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

**Published:**

— *without international search report and to be republished upon receipt of that report*

*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

**Speaker Arrangement**

The present invention relates to a speaker arrangement used particularly, but not exclusively, to increase the performance of low cost loudspeakers in concealed or secure applications (such as behind advertising display panels), where a conventional speaker grill cannot be used.

Conventional speaker arrangements for use in such concealed applications (such as behind advertising display panels), must be permanently fixed to the rear surface of the display panel in order to transmit the sound effectively. If not securely fixed, poor sound quality results.

According to the present invention there is provided a speaker arrangement comprising a sound emitting element, a filling material engaging the sound emitting element and defining a first generally planar surface adapted to abut a second generally planar surface such that sound is transmitted from

the sound emitting element through the filling material to the second planar surface.

Preferably, the filling material is inserted into the interior of the sound emitting element.

Preferably, the sound emitting element is in the form of a cone.

Preferably, the first planar surface is at the base of the cone.

Preferably, the second planar surface resonates to produce sound.

Preferably the filling material is formed of one of the following materials:
Liquids such as water and water based solutions, alcohol (e.g. methanol, ethanol), metals (such as mercury), glycerinates, oils (synthetic, mineral or vegetable);
gels such as gelatines, petroleum, silicon, polymeric gels;
greases such as silicon, graphite, petroleum;
elastomers such as silicon rubber, natural rubber/latex, PVC, acrylate cross polymers;
solids (powders) such as graphite, iron, talcum.

Preferably, an intermediate layer is provided between the first planar surface and the second planar surface, said intermediate layer acting to hold the cone against the second planar surface.

Preferably the intermediate layer is formed of silicon grease.

Preferably, the filling material is retained within the cone by a membrane which is conjoined to the base of the cone.

Preferably the membrane is formed of one of the following materials:
polypropylene, PVC, styrene, PTFE, rubber (natural or silicon) or cellulose.

Embodiments of the present invention will now be described by way of example only, with reference to the accompanying drawings, where:

Fig. 1 is an exploded schematic perspective view of part of the speaker arrangement of the present invention, viewed from below;

Fig. 2 is an exploded schematic perspective view of part of the speaker arrangement of Fig. 1, viewed from above;

Fig. 3 is a schematic perspective view of part of the speaker arrangement of the present invention, viewed from above; and

Fig. 4 is a schematic cross sectional diagram of one embodiment the speaker arrangement of the present invention.

Referring to the drawings, there is illustrated a speaker arrangement 10 which comprises a sound emitting element which is formed of a standard loudspeaker 11 having a cone 12. The cone 12 is filled with a filling material 13 which is inserted into the interior of the cone 12.

The filling material 13 fills the interior of the cone 12 and defines a first planar surface at the base of the cone 12.

The filling material 13 is retained in place by a membrane 14 which is joined to the base end of the cone 12.

The first planar surface abuts against a second planar surface (such as the rear side of a graphic display panel 15) by way of an intermediate layer 16 which is provided between the first planar surface and the second planar surface. The intermediate layer 16 acts to removeably attach the loudspeaker 11 (with the filling material 13 inserted) to the rear of the display panel 15. The loudspeaker 11 may also be permanently attached to the rear of the display panel 15 if desired. The speaker arrangement 10 can also operate with no membrane 14 and/or no intermediate layer 16.

The first planar surface of the filling material 13 can protrude slightly from the base of the cone 12 to define an expansion gap around the perimeter of

the base of the cone 12, between the base of the cone 12 and the second planar surface.

The invention has broad applications and alternative uses are envisaged for the loudspeaker 11 having the filling material 13 inserted, for example, instead of being used at the rear of a display panel 15, the loudspeaker 11 could be attached to the rear of wall panels, plasterboard, glass, wood, tiles or any other surface. The loudspeaker 11 with fill material 13 inserted is particularly useful in concealed location where it is preferable that no hole is cut in the mounting surface to hold the speaker and where it is desirable not to have a visible speaker grill, such as for cases where aesthetic or security considerations must be taken into account.

There are many envisaged materials which could be used in the forming of the speaker arrangement 11, some of these are listed below:

The filling material 13 may be formed of one of the following materials:

Liquids such as water and water based solutions, alcohol (e.g. methanol, ethanol), metals (such as mercury), glycerinates, oils (synthetic, mineral or vegetable);

gels such as gelatines, petroleum, silicon, polymeric gels;

greases such as silicon, graphite, petroleum;

elastomers such as silicon rubber, natural rubber/latex, PVC, acrylate cross polymers; solids (powders) such as graphite, iron, talcum.

Alternatively, it is also envisaged that pressurised gas could be utilised as the filling material 13, the membrane 14 acting to contain the pressurised gas within the cone 12.

The intermediate layer 16 may be formed of silicon grease.

The membrane 14 may be formed of one of the following materials:
polypropylene, PVC, styrene, PTFE, rubber (natural or silicon) or cellulose.

The cone 12 may be formed of one of the following materials:
Polypropylene, Mylar, Kevlar, Carbon Fibre, Aluminium, Polycarbonate, Styrene or paper.

The loudspeaker 11 is driven by an amplifier (not shown) which is integrated into circuitry, the circuitry also including an audio input (such as an MP3 player), volume control and a power source. The circuitry can also incorporate further input signals such as signals from activation sensors and signals from a communication device used to update the audio data utilised by the MP3 player.

In use in the specific application of the graphic display panel, the speaker arrangement 10 is connected to the rear of the display panel 15. The loudspeaker 11 is connected to the amplifier (incorporated into the circuitry). Optional sensors can also be connected to the circuitry to provide an interactive element to the display panel 15. For example, the sensors may activate the audio input when they detect the motion of a person passing the display panel 15, detect the touch of a specific area of the display panel or may be set to activate the audio input on a time dependent loop.

The MP3 player on the circuitry is loaded with audio data, such as an advertising trailer. Multiple advertising trailers can be stored for use and different advertising trailers may be loaded to activate corresponding to specific sensors which are activated.

When activated, the MP3 player and the amplifier are adapted, by way of circuitry, to send a signal to the loudspeaker 11 which drives the loudspeaker 11 to emit a sound. This sound passes through the filling material 13, the membrane 14 and the intermediate layer 16 and is transmitted to the display panel 15, which resonates to produce sound.

It has been found that the sound quality of the sound emitted from the resonating display panel 15 when using the loudspeaker 11 filled with the filling material 13 is greatly enhanced over the use

of a speaker having no filling material 13, both the bass and the mid range responses are enhanced.

The MP3 audio input used may be substituted for any other suitable form of audio input such as, for example, compact disc, mini-disc or microphone.

Modifications and improvements may be made to the foregoing without departing from the scope of the present invention.

The speaker arrangement of the invention can be advantageously used in a method of providing display panels. Accordingly there is also provided a method of providing display panels, the display panels incorporating an audio player and speaker, the method comprising the steps of supplying and distributing display panels incorporating a speaker, designing and producing panel graphics to be displayed on the display panels, producing and directing audio messages, producing and distributing of the audio messages to a consumer, and updating and replacing the art work on the graphic panels when necessary.

Preferably, the audio messages are in MP3 format and can be updated and/or distributed via the Internet, Intranet, by modem link or by mobile telephone connection or any other communication link.

The method of providing display panels as illustrated in Fig.5. is a turnkey system where all

the customers needs in obtaining and maintaining display panels are catered for.

The method comprises the steps of the supply and distribution of speaker display panels (such as those described above), the origination and production of panel graphics, the production and direction of audio messages, the production and distribution of audio message updates and distribution of these updates via a communication device such as the internet, and the updating and replacement of the artwork on the display panels.

Modifications and improvements may be made to the foregoing without departing from the scope of the present invention.

Claims

1. A speaker arrangement comprising a sound emitting element, a filling material engaging the sound emitting element and defining a first generally planar surface adapted to abut a second generally planar surface such that sound is transmitted from the sound emitting element through the filling material to the second planar surface.

2. A speaker arrangement as claimed in Claim 1, wherein the filling material is inserted into the interior of the sound emitting element.

3. A speaker arrangement as claimed in Claim 1 or Claim 2, wherein the sound emitting element is in the form of a cone.

4. A speaker arrangement as claimed in Claim 3, wherein the first planar surface is at the base of the cone.

5. A speaker arrangement as claimed in any preceding claim, wherein the second planar surface resonates to produce sound.

6. A speaker arrangement as claimed in any preceding claim, wherein the filling material is selected from one of the following materials: liquids; gels; alcohols; metals; oils; greases; elastomers; solids; powders.

7. A speaker arrangement as claimed in any preceding claim, wherein the filling material is selected from one of the following materials: water; water based solutions; methanol; ethanol; mercury; glycerinates; synthetic oils, mineral oils or vegetable oils; gelatines; petroleum gel; silicon gel; polymeric gels; silicon grease; graphite grease; petroleum grease; silicon rubber; natural rubber/latex; PVC; acrylate cross polymers; graphite solids; iron solids; talcum.

8. A speaker arrangement as claimed in any preceding claim, wherein an intermediate layer is provided between the first planar surface and the second planar surface.

9. A speaker arrangement as claimed in Claim 8, wherein the intermediate layer is formed of silicon grease.

10. A speaker arrangement as claimed in any of Claims 3 to 9 when dependent upon Claim 3, wherein the filling material is retained within the sound emitting element by a membrane.

11. A speaker arrangement as claimed in Claim 10, wherein the membrane is formed of one of the following materials: polypropylene, PVC, styrene, PTFE, rubber (natural or silicon) or cellulose.

12. A method of providing display panels, the display panels incorporating an audio player and speaker, the method comprising the steps of supplying and distributing display panels incorporating a speaker, designing and producing panel graphics to be displayed on the display panels, producing and directing audio messages, producing and distributing of the audio messages to a consumer, and updating and replacing the art work on the graphic panels when necessary.

13. A method as claimed in Claim 11, wherein the audio messages are in MP3 format and can be updated or distributed via a communication link.

14. A method as claimed in Claim 11 or Claim 12 comprising the steps of the supply and distribution of speaker display panels, the origination and production of panel graphics, the production and direction of audio messages, the production and distribution of audio message updates and distribution of these updates via a communication device such as the internet, and the updating and replacement of the artwork on the display panels.

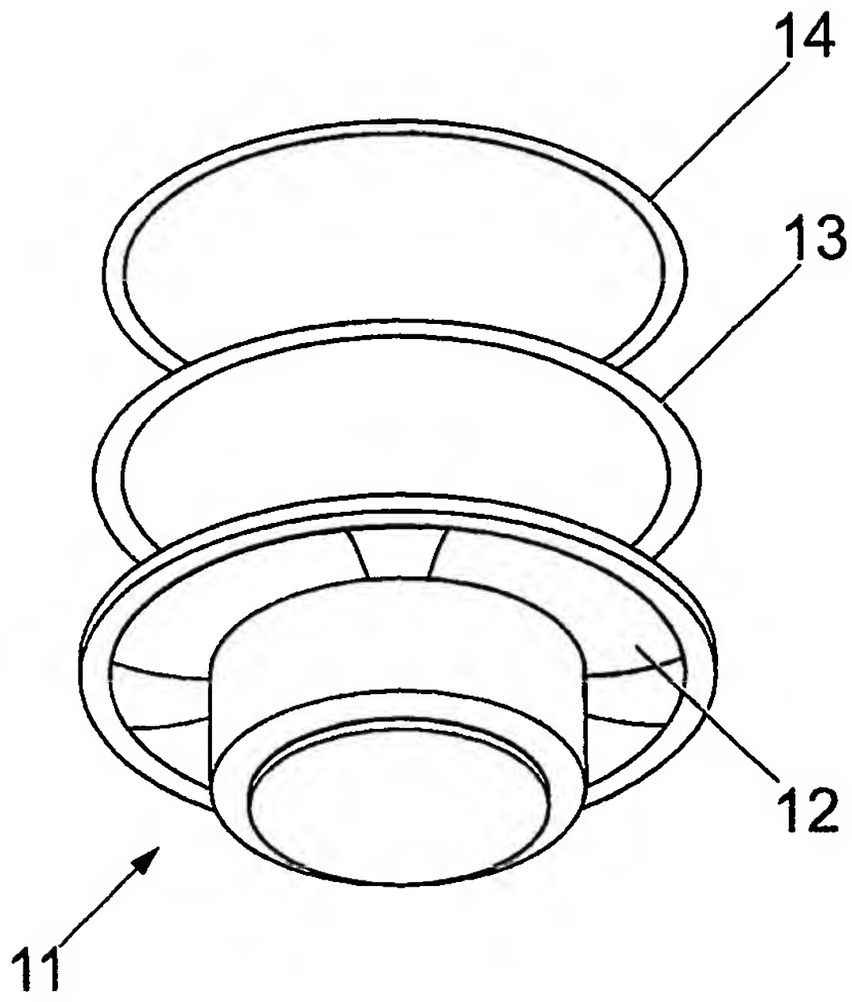



Fig. 1

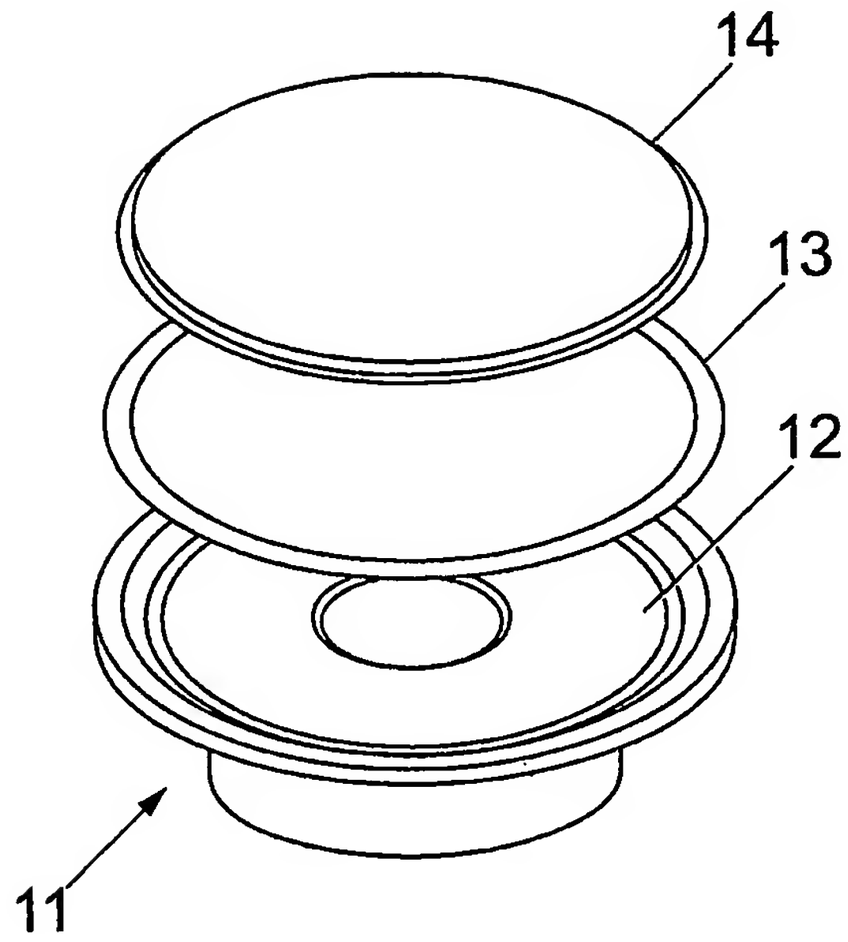



Fig. 2

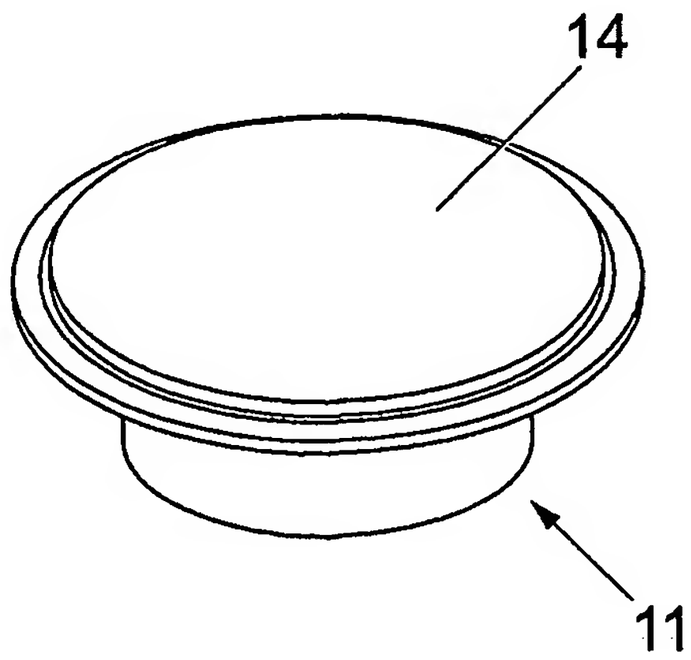



Fig. 3

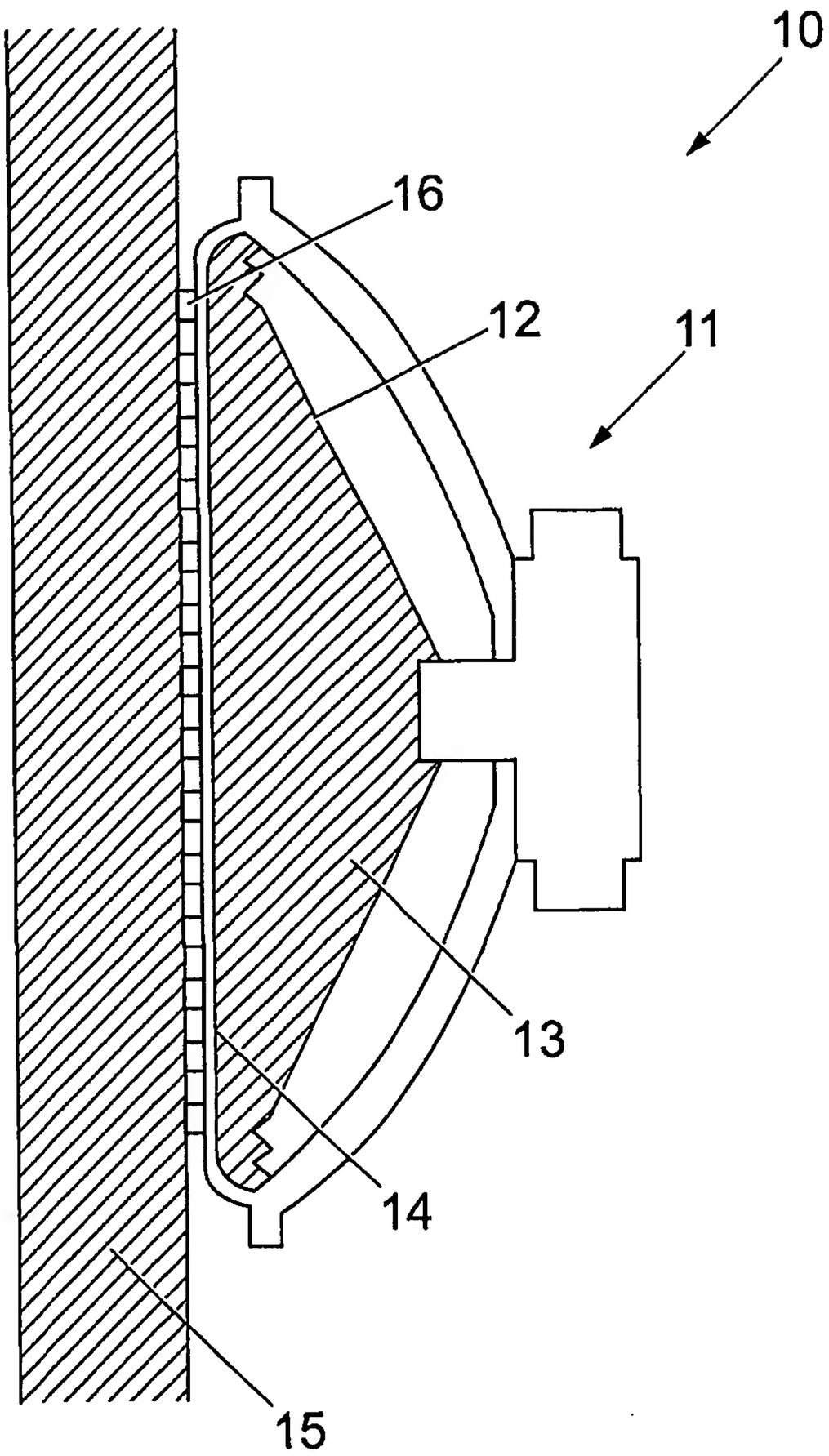



*Fig. 4*

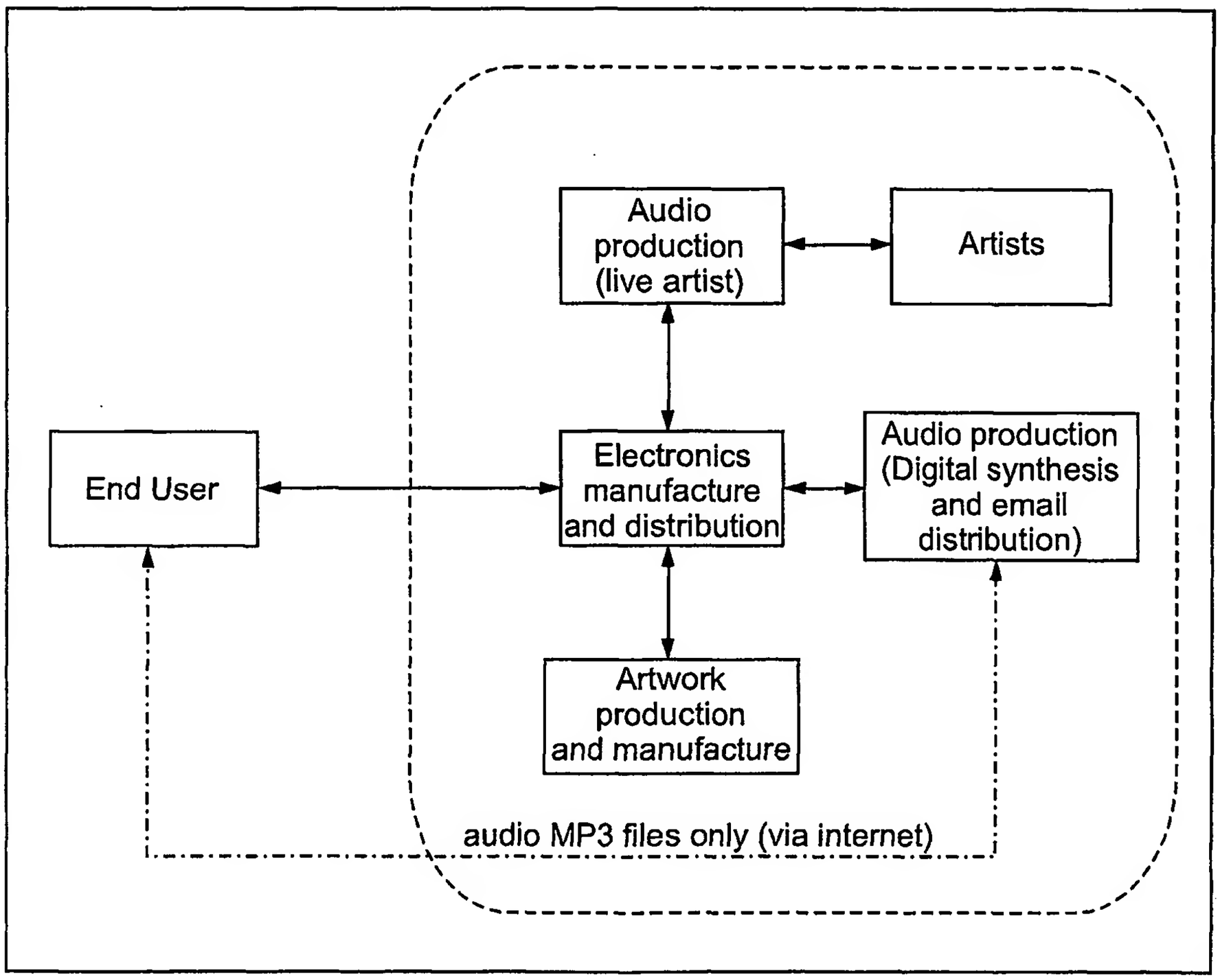

Audio production (live artist)
Artists
End User
Electronics manufacture and distribution
Audio production (Digital synthesis and email distribution)
Artwork production and manufacture
audio MP3 files only (via internet)

Fig. 5

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(71) Applicant *(for all designated States except US)*: **HARRIS HYND LIMITED** [GB/GB]; Business Innovation Centre, 15 Cromarty Campus, Rosyth Europarc, Fife KY11 2YB (GB).

(72) Inventors; and

(75) Inventors/Applicants *(for US only)*: **HYND, Ian, Alexander** [GB/GB]; 8 Lovedale Crescent, Balerno, Midlothian EH14 7DP (GB). **HARRIS, Norman, Richard** [GB/GB]; Shoemakers Cottage, Tanhouse Brae, Culross, Fife KY12 8HX (GB).

(74) Agent: **KENNEDYS PATENT AGENCY LIMITED**; 29 St. Vincent Place, Glasgow G1 2DT (GB).

(81) Designated States *(national)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, OM, PH, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZM, ZW.

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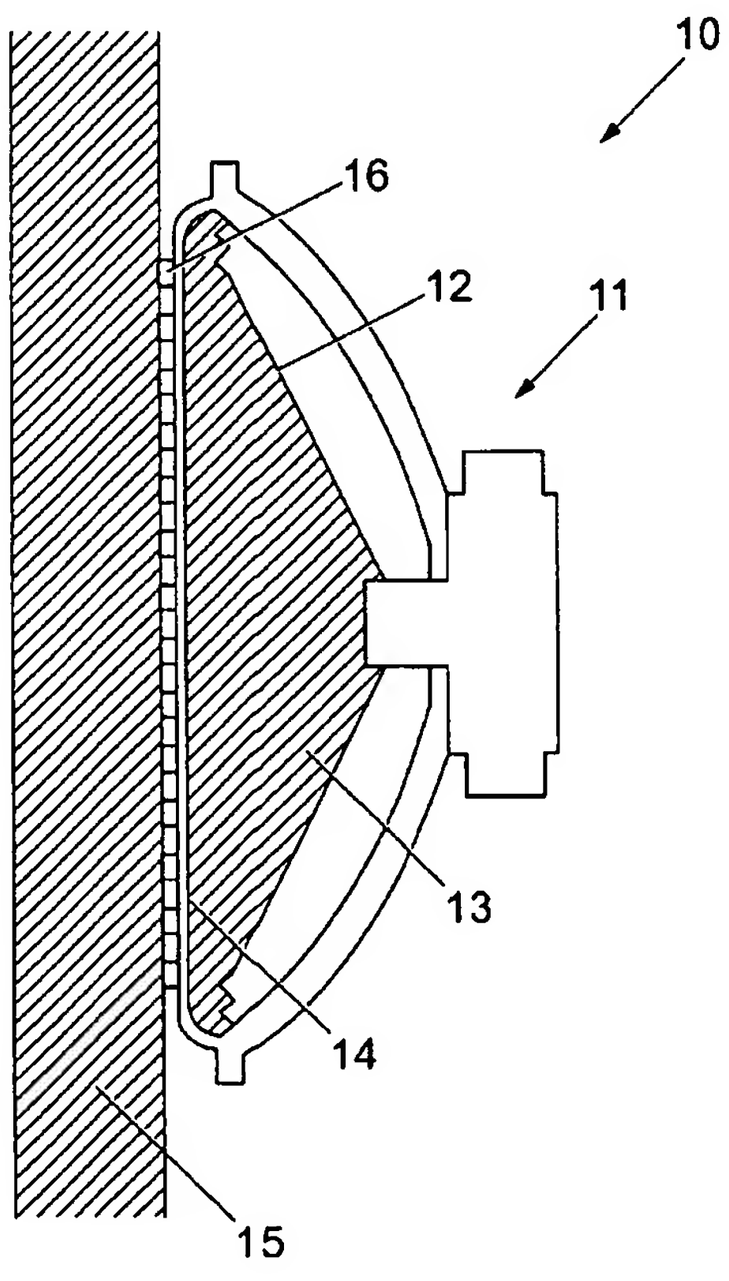
(54) Title: SPEAKER ARRANGEMENT




(57) Abstract: There is described a speaker arrangement (10) which comprises a sound emitting element which is formed of a standard loudspeaker (11) having a cone (12). The cone (12) is filled with a filling material (13) which is inserted into the interior of the cone (12). There is also described a method of providing display panels, the display panels incorporating an audio player and speaker, the method comprising the steps of supplying and distributing display panels incorporating a speaker, designing and producing panel graphics to be displayed on the display panels, producing and directing audio messages, producing and distributing of the audio messages to a consumer, and updating and replacing the art work on the graphic panels when necessary.

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# INTERNATIONAL SEARCH REPORT

International Application No
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A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 H04R7/04 H04R1/02 H04R7/12

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 7 · H04R

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category ° | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
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[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

° Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

| Date of the actual completion of the international search | Date of mailing of the international search report |
|---|---|
| 28 February 2003 | 15. 05. 03 |

| Name and mailing address of the ISA | Authorized officer |
|---|---|
| European Patent Office, P.B. 5818 Patentlaan 2<br>NL - 2280 HV Rijswijk<br>Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,<br>Fax: (+31-70) 340-3016 | Gerken, S |

Form PCT/ISA/210 (second sheet) (July 1992)

# INTERNATIONAL SEARCH REPORT

International Application No
PCT/GB 02/01109

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

| Category ° | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|---|---|---|
| X | US 3 861 495 A (PEARSON JOHN R)<br>21 January 1975 (1975-01-21)<br>column 1, line 30 -column 2, line 20;<br>claim 5; figures 1,2<br>----- | 1-3,5,6,<br>11 |

# INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB 02/01109

## Box I Observations where certain claims were found unsearchable (Continuation of item 1 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

## Box II Observations where unity of invention is lacking (Continuation of item 2 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. ☐ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

1-11

**Remark on Protest**

☐ The additional search fees were accompanied by the applicant's protest.

☐ No protest accompanied the payment of additional search fees.

# INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB 02/01109

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. Claims: 1-11

   A speaker arrangement comprising a sound emitting element, which may have the form of a cone, the sound emitting element being filled with a material which abuts a planar resonating and sound producing surface. Object: To enhance the quality of the sound emitted from the resonating surface.

2. Claims: 12-14

   A method of providing display panels comprising the steps of supplying and distributing display panels incorporating an audio player such as an MP3-player and a speaker, designing and producing panel graphics to be displayed on the display panels, producing audio messages and distributing them to a consumer, preferably via a communication link such as the Internet, and updating and replacing the art work on the graphic panels when necessary. Object: To provide a turnkey system wherein all customer needs in obtaining and maintaining display panels are catered for.

Apart from the trivial feature that a loudspeaker is provided there are no overlapping features in the above inventions 1 and 2. Hence, there is a priori no common concept linking said inventions so as to form a single general inventive concept (Rule 13.1 PCT).

# INTERNATIONAL SEARCH REPORT

Information on patent family members

Inte[redacted]onal Application No
PCT/GB 02/01109

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
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